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A taxonomical revision of '*Dongfangaspis qujingensis*' from the Lower Devonian of Qujing, Yunnan Province

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Abstract The affinity of '*Dongfangaspis qujingensis*', initially assigned to *Dongfangaspis* but later to *Laxaspis*, has long been controversial. However, the taxonomical revision raises a new problem of junior homonym since the type species of *Laxaspis* is *L. qujingensis*. Here, we describe some new materials of '*Dongfangaspis qujingensis*' and *Damaspis vartus* from the Xishancun Formation (early Lochkovian, Early Devonian) in Qujing, Yunnan Province. '*Dongfangaspis qujingensis*' strikingly resembles *Damaspis vartus* in the slightly longer headshield, bifurcated ends of the lateral transverse canals, unconnected V-shaped posterior supraorbital canals, and at least seven pairs of lateral transverse canals issuing from the lateral dorsal canal. These similarities indicate that '*D. qujingensis*' is more suggestive of *Damaspis* than *Dongfangaspis* and *Laxaspis*. Therefore, we propose to remove '*Dongfangaspis qujingensis*' from *Laxaspis* to *Damaspis*. The new specimens of *Damaspis vartus* reveal five long lateral transverse canals on the right side, corroborating that the asymmetric sensory canal system in the holotype is the intraspecific variation.

Key words Qujing, Yunnan; Lower Devonian; Xishancun Formation; *Damaspis*, Polybranchiaspidae, Galeaspids

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1 Introduction

The Polybranchiaspidae is the most diversified galeaspid family including nine genera *Bannhuaspis*, *Dongfangaspis*, *Polybranchiaspis*, *Laxaspis*, *Damaspis*, *Siyingia*, *Cyclodiscaspis*, *Diandongaspis*, and *Altigibbaspis* (Liu, 1965, 1975; Wang and Wang, 1982a; Janvier et al., 1993; Si et al., 2015; Liu et al., 2018), and represents the second radiation of galeaspids during the early Lochkovian, Early Devonian (Zhao and Zhu, 2007). As an important component of the Xitun Vertebrate Fauna that includes a diversity of galeaspids

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(Liu, 1965, 1975; P'an and Wang, 1978; Zhu, 1992; Gai and Zhu, 2007; Sun et al., 2022), thelodonts (Wang and Dong, 1989; Wang, 1995a, b), placoderms (Zhu, 1996), acanthodians (Wang and Dong, 1989), and sarcopterygians (Zhu and Schultze, 1997; Zhu et al., 1999), this family is also of great significance in studies of Early Devonian biodiversity and evolution (Zhao and Zhu, 2015; Zhao et al., 2021). Except for *Bannhuanaspis* and *Dongfangaspis*, most polybranchiaspids are reported from the Xishancun Formation, Qujing, Yunnan Province. However, the diagnoses of species are not distinctive, resulting in the controversial assignment of these species. For example, *Dongfangaspis paradoxus* and *D. yunnanensis* (Fang et al., 1985) from the Xishancun Formation in Qujing, Yunnan, were recognized as the junior synonyms of *Polybranchiaspis liaojiaoshanensis* (Zhu et al., 2015). Another taxonomically contentious species is '*Dongfangaspis qujingensis*'. '*D. qujingensis*' was erected based on the specimen GMC V1753, which preserved only an incomplete headshield (Pan and Wang, 1981). However, Zhu and Gai (2006) proposed that *D. qujingensis* is more suggestive of *Laxaspis* than *Dongfangaspis* in the overall shape of the headshield, the ornamentation, and the number of branchial fossae. They removed '*Dongfangaspis qujingensis*' to the genus *Laxaspis*. However, the taxonomical revision raises a new problem of junior homonym since the type species of *Laxaspis* is *L. qujingensis* (Liu, 1975). Therefore, a new species name should be proposed to replace '*D. qujingensis*'. One significant difference between '*Dongfangaspis qujingensis*' and *Laxaspis qujingensis* is the end of the lateral transverse canals. The former is bifurcated, whereas the latter is stellated. Zhu and Gai (2006) doubted that the stellated ends of sensory canals in *L. qujingensis* are reflections of the ornamentations. Considering the possibility that '*D. qujingensis*' is the junior synonym of *L. qujingensis*, they suggested '*Dongfangaspis qujingensis*' retains its original name with quotation marks for more material and observation (Zhu and Gai, 2006). In addition, Pan (1992) described a new specimen of '*D. qujingensis*' GMC V2072, however, this specimen was later considered the junior homonym of '*D. qujingensis*' and represent a new species of *Laxaspis* denominated as *Laxaspis cf. L. qujingensis* (Zhu et al., 2015).

Since 2012, the authors have organized several field excursions in the lower part of the Xishancun Formation in Qujing and collected abundant new polybranchiaspid materials including *Polybranchiaspis*, '*D. qujingensis*', *Laxaspis*, and *Damaspis*. Here, based on these new materials, we present a detailed redescription of '*D. qujingensis*' to reveal its morphological nature and clarify its assignment. Additionally, new specimens of *Damaspis vartus* are also described here to verify the uncertain morphological features of the species. The new materials and observations indicate that '*D. qujingensis*' is more suggestive of *Damaspis* than *Dongfangaspis* and *Laxaspis*. Therefore, we propose to remove '*Dongfangaspis qujingensis*' from *Laxaspis* to *Damaspis*.

2 Materials and methods

The new material from the Xishancun Formation includes three nearly complete (IVPP V5017.2–4) and three fragmentary headshields (IVPP V5017.5–7) of ‘*Dongfangaspis qujingensis*’, and three incomplete headshields (IVPP V6259.4–6) of *Damaspis vartus*. All specimens were prepared mechanically using a vibro tool with a tungsten-carbide bit or a needle, measured with a digital vernier caliper as well as ImageJ software, and studied under an Olympus SZ61 zoom stereo microscope. All specimens were photographed with a Canon EOS 5D Mark III camera coupled with a Canon macro photo lens EF 100 mm 1:2.8 L for the general morphology. All fossils are permanently housed for reference in the Institute of Vertebrate Paleontology and Paleoanthropology (IVPP), Chinese Academy of Sciences.

3 Systematic paleontology

Subclass Galeaspida Tarlo, 1967

Order Polybranchiaspiformes Liu, 1965

Family Polybranchiaspidae Liu, 1965

Genus *Damaspis* Wang & Wang, 1982a

Type species *Damaspis vartus* (Wang and Wang, 1982a).

Diagnosis (emended) Medium-sized polybranchiaspid fish; oval-shaped headshield longer than wide ($\text{length}/\text{width} > 1$); widest point situated between the third and fourth lateral transverse canals; median dorsal ridge low and posteriorly ascending; inner cornual process broad leaf-shaped; paired V-shaped posterior supraorbital canals unconnected with each other; lateral dorsal canal extending along the mesial margin of the inner cornual process; at least seven pairs of lateral transverse canals issuing from the lateral dorsal canal; ends of lateral transverse canals bifurcated; 15–18 pairs of branchial fenestra.

Damaspis qujingensis sp. nov.

(Figs. 1–3)

Dongfangaspis qujingensis Pan and Wang, 1981; Pan, 1992

‘*Dongfangaspis qujingensis*’ Zhu and Gai, 2006

Holotype An incomplete headshield, GMC V1735.

Referred specimen Three nearly complete headshields, IVPP V5017.2–4 and three fragmentary headshields, V5017.5–7.

Locality and horizon Xishan Reservoir, Xicheng Street, Qilin District, Qujing City, Yunnan Province, China; Xishancun Formation, lower Lochkovian, Lower Devonian.

Measurements See Table 1.

Diagnosis Oval headshield with 112.4 to 117.7 mm in maximum length and 99.0 to

110.5 mm in maximum width; transversely oval median dorsal opening with width/length ratio of about 1.7; two lateral transverse canals issuing from the infraorbital canals; four long and three short lateral transverse canals issuing from the lateral dorsal canal; ornamentation composed of large and stellated tubercles with the diameter of a single tubercle varying from 1.0 to 2.0 mm.

Description *Damaspis qujingensis* is a medium-sized polybranchiaspid jawless fish with an oval-shaped headshield (Fig. 1A–D). The rostral margin of the headshield is arciform without rostral process while the posterior margin is deeply embayed (Figs. 1A–D, 2A). The maximum length of the headshield varies from 115.2 to 117.7 mm, the maximum width varies from 98.4 to 110.5 mm, and the length of the headshield in midline varies from 92.5 to 99.5 mm (Table 1). There are about 10% variations in the maximum width of the headshield. On



Fig. 1 Nearly complete headshields of *Damaspis qujingensis* (IVPP V5017.2–4)
A, B. IVPP V5017.2 (A), V5017.3 (B), in dorsal views; C, D. V5017.4,
in dorsal (C) and ventral (D) views; scale bars equal 10 mm

Abbreviations: br. region. branchial region; dcm. dorsal commissure; ic. inner cornual process; ifc. infraorbital canal; ldc. lateral dorsal canal; ltc. lateral transverse canal; md.o. median dorsal opening; md.r. median dorsal ridge; md.s. median dorsal spine; obr.c. oralbranchial chamber; orb. orbital opening; pi. pineal opening; soc₁. anterior supraorbital canal; soc₂. posterior supraorbital canal; vr. ventral rim

the dorsal side of the headshield, behind the dorsal commissure (dcm), a low and flat median dorsal ridge (md.r, Fig. 1A–C) raises and extends along the midline to the posterior margin of the headshield, forming a median dorsal spine (md.s, Fig. 1A, C). Caudally, the headshield protrudes into a pair of inner cornual processes (ic, Figs. 1A, D, 2A), which are broad leaf-shaped with a distance between them ranging from 41.6 to 46.1 mm. The ornamentation of the headshield in all specimens is composed of large stellated tubercles with the diameter of a single tubercle varying from 1.0 to 2.0 mm.

The median dorsal opening (md.o, Figs. 1A–C, 2A) is oval in outline with the short axis aligned with the rostro-caudal axis of the headshield. The length of the long axis of the median dorsal opening varies from 19.6 to 23.2 mm, and the length of the short axis varies from 12.2

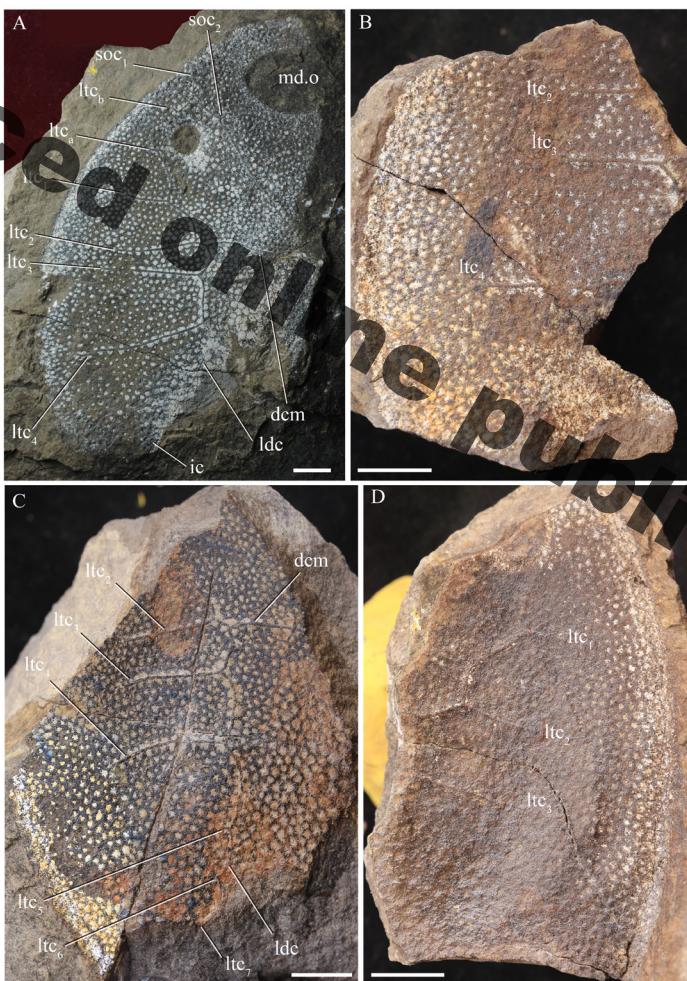


Fig. 2 The sensory canal system of *Damaspis qujingensis* (Holotype and V5017.5–7)
 A. an incomplete headshield, GMC V1735, holotype, in ventral view; B–D. three fragmentary headshields, IVPP V5017.5 (B), V5017.6 (C), V5017.7 (D), in ventral views; scale bars equal 10 mm
 For abbreviations see Fig. 1

to 13.6 mm (Table 1). The length of the long axis of median dorsal opening is about 1.7 times the length of the short axis.

The orbital opening (orb, Figs. 1A–C, 2A) has a dorsal position on the headshield. The orbital opening is oval in outline with a long axis ranging from 7.7 to 8.4 mm. The distance between paired orbital openings ranges from 45.6 to 48.7 mm (Table 1). The pineal opening (pi), well preserved in specimen V5017.4 (Fig. 1C), is in the midline of the headshield, posterior to the posterior margin of orbital openings. The pineal opening is tiny and round in outline with a diameter of about 2.0 mm (Table 1).

The sensory canal system, which is exposed as grooves in the internal moulds of specimens, displays a typical polybranchiaspid pattern. The infraorbital canal connects with the lateral dorsal canal to constitute the main longitudinal canal from which nine pairs of lateral transversal canals issue. Among them, two pairs (ltc_{a-b}, Figs. 1A–C, 2A, 3A) issue from the infraorbital canal and seven pairs (ltc₁₋₇, Figs. 2A–D, 3A) from the lateral dorsal canal. The fourth lateral transversal canal (ltc₄) is the longest, reaching nearly to the lateral margin of the headshield in specimen V5017.4 (Fig. 1C). It is noteworthy that, posterior to the fourth lateral transversal canal, there are still 2–3 pairs of short lateral transversal canals (ltc₅₋₇) issuing from

Table 1 Measurements and comparisons of *Damaspis* (mm)

Items	<i>D. varius</i> IVPP V6259				<i>D. qujingensis</i> IVPP V5017		
	1	4	5	6	2	3	4
Maximum length of the headshield	93.4	102.4	—	103.4	115.2	117.7	—
Maximum width of the headshield	85.5	97.2	106.2	—	98.4	102.8	110.5
Length of the headshield in midline	69.0	—	—	—	92.5	99.5	—
Long axis of orbital openings	5.4	6.0	—	5.6	7.7	8.2	8.4
Distance between orbital openings	32.8	31.2	—	37.4	45.6	47.0	48.7
Long axis of median dorsal opening	18.8	17.0	—	17.7	19.6	23.2	22.8
Short axis of median dorsal opening	9.8	8.4	—	8.5	12.2	13.3	13.6
Diameter of pineal opening	1.3	0.9	1.2	1.1	—	—	2.0

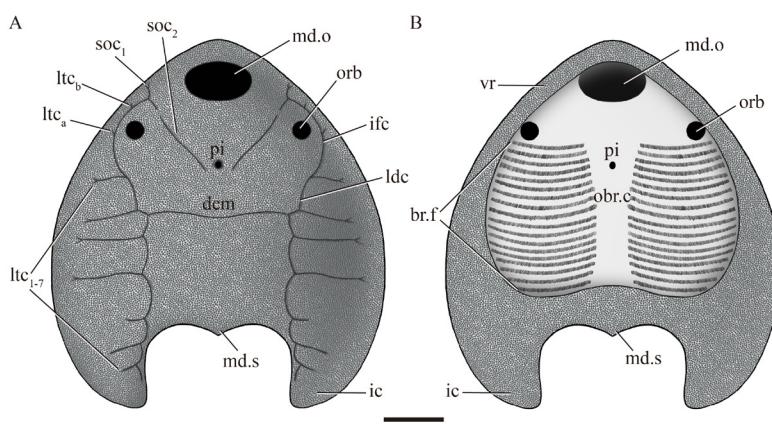


Fig. 3 Restoration of *Damaspis qujingensis* sp. nov. in dorsal (A) and ventral (B) views
Scale bar equals 10 mm. For abbreviations see Fig. 1 plus br.f. branchial fossa

the lateral dorsal canal, which can be observed in specimen V5017.6 (Fig. 2C). The ends of the lateral transverse canals are bifurcated, which are present in the holotype (Fig. 2A) and the specimen V5017.4 (Fig. 1C). The dorsal commissure (dcm, Figs. 1A–C, 2A, C), which is level with the second lateral transverse canal, connects the lateral dorsal canals on both sides. The supraorbital system consists of posterior and anterior supraorbital canals. The paired posterior supraorbital canals (soc_2 , Figs. 1A–C, 2A, 3A) are V-shaped, converging posteriorly towards the pineal opening but not connected. The anterior supraorbital canal (soc_1 , Figs. 1C, 2A) extends anteriorly nearly to the margin of the headshield. It converges posteriorly with the posterior supraorbital canal and the infraorbital canal anterior to the orbital openings.

The ventral side of the headshield shows a large oval-shaped oralobranchial chamber (obr., Figs. 1D, 3B), which is encompassed by a pair of ventral rims. The ventral rim (vr, Figs. 1D, 3B) is thin but broadens gradually from the anterior margin and reaches the broadest at the base of the inner cornual process. The length of the branchial region (br. region) in IVPP V5017.4 (Fig. 1D) is approximately 60.0 mm, accounting for 1/2 of the whole headshield length, a ratio the same as that in *Damaspis vartus*. Therefore, the number of the branchial fossae (br.f, Fig. 3B) in *Damaspis qujingensis* is estimated to be 18 pairs as in *Damaspis vartus* (Fig. 3B).

Damaspis vartus Wang & Wang, 1982a

(Figs 4–6)

Holotype A complete headshield and its external mould, IVPP V6259.1.

Paratype Two incomplete headshields, IVPP V6259.2, 3.

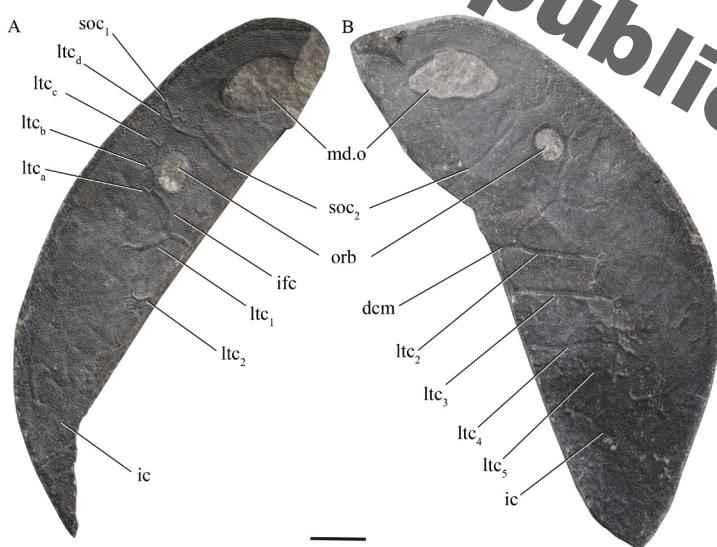


Fig. 4 Photographs of *Damaspis vartus* (IVPP V6259.4) from Qujing, Yunnan
An incomplete headshield, IVPP V6259.4a, in ventral view (A)
and its internal mould, V6259.4b, in dorsal view (B)
Scale bar equals 10 mm. For abbreviations see Fig. 1

Referred specimen Three incomplete headshields, IVPP V6259.4–6.

Locality and horizon Miadian Reservoir in the Triathlon Sports Park, Qilin District, Qujing City, Yunnan Province, China; Xishancun Formation, lower Lochkovian, Lower Devonian.

Measurements See Table 1.

Diagnosis (emended) oval headshield with 93.4 to 103.4 mm in maximum length and 85.5 to 106.2 mm in maximum width; transversely oval median dorsal opening with anterior margin protruding obviously; four lateral transverse canals ($l_{tc_{a-d}}$) issuing from the infraorbital canals; five long and three short lateral transverse canals issuing from the lateral dorsal canal; ornamentation composed of small granular tubercles with a density of 6–8 tubercles per square millimeter.

Remarks The sensory canal system on the dorsal headshield of galeaspids is generally bilaterally symmetric. However, in the holotype of *Damaspis vartus*, the sensory canal system of the headshield is asymmetric with five long lateral transverse canals on the left side but four on the right side, which was interpreted as the intraspecific variation (Wang and Wang, 1982a). Two new specimens of *Damaspis vartus* display five long lateral transverse canals on the right side of the headshield. This suggests that the fifth long lateral transverse canal is a natural feature of *Damaspis vartus*, while four long lateral transverse canals on the right side of the holotype are caused by intraspecific variation.

Description The new specimens of *Damaspis vartus* include three incomplete headshields (IVPP V6259.4–6, Figs. 4, 5). Like the holotype of *D. vartus*, all new specimens bear oval headshields with the maximum width left between the third and fourth lateral transverse canals (l_{tc_3} and l_{tc_4} , Figs. 4B, 5A, B, C). The maximum length of the headshield ranges from 93.4 to 103.4 mm, and the maximum width ranges from 85.5 mm to 106.2 mm (Table 1). The specimen V6259.5a (Fig. 4A) preserves a complete inner cornual process (ic) which is broad leaf-shaped. The lateral margin of the headshield is smooth.

The median dorsal opening (md.o, Figs. 4A, B, 5C) is nearly oval in outline, with its posterior margin roughly straight and its anterior margin obviously protruding. The length of the long axis of the median dorsal opening varies from 17.0 to 18.8 mm, and the length of the short axis varies from 8.4 to 9.8 mm (Table 1). The long axis of the median dorsal opening is about 2.0 times the length of the short axis.

The shape and positions of the orbital openings (orb, Figs. 4A, B, 5C) and the pineal opening (pi, Fig. 5A, C) of the new specimens resemble those of the holotype. The orbital openings are oval with a long axis length varying from 5.4 to 6.0 mm. The distance between two orbital openings ranges from 31.2 to 37.4 mm (Table 1). The pineal opening is round and tiny with a diameter varying from 0.9 to 1.3 mm (Table 1).

The distribution pattern of sensory canals in new specimens is quite similar to that in the

holotype, which is characterized by the bifurcated ends of the sensory canals, paired V-shaped posterior supraorbital canals being not connected, lateral dorsal canals that extend along the



Fig. 5 Photographs of *Damaspis vartus* (IVPP V6259.5, 6) from Qujing, Yunnan
 A, B. an incomplete headshield, IVPP V6259.5a, in dorsal view (A) and its external mould, V6259.5b, in ventral view (B); C. an incomplete headshield, V6259.6, in dorsal view; scale bars equal 10 mm

For abbreviations see Figs. 1, 3

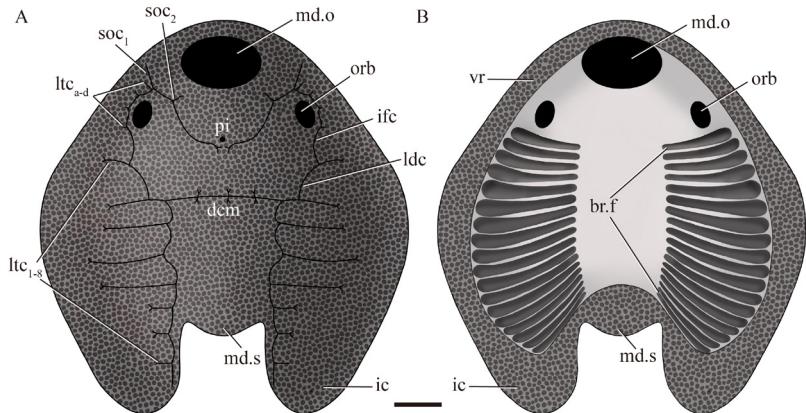


Fig. 6 Restoration of *Damaspis vartus* in dorsal (A) and ventral (B) views
 Scale bar equals 10 mm. For abbreviations see Figs. 1, 3

mesial margin of the inner cornual process, and three short longitudinal canals issuing from the median transverse canal. Unlike previous observations, there are four lateral transverse canals ($l_{tc_{a-d}}$), rather than three lateral canals, issuing from the infraorbital canals (Fig. 4A). In specimen IVPP V6259.4b and V6259.5a (Figs. 4B, 5A), both of which are internal moulds of the headshield, five long lateral transverse canals ($l_{tc_{1-5}}$) are observed issuing from the lateral dorsal canal on the right side of the headshield, followed by three short lateral transverse canals in V6259.5a ($l_{tc_{6-8}}$). In the holotype, there are also five lateral dorsal canals on the left side of the headshield, but only four ($l_{tc_{1-4}}$) on the right. This was interpreted as a phenomenon of intraspecific variation of the holotype (Wang and Wang, 1982a).

Like the holotype of *Damaspis vartus*, the new specimen is ornamented with small, dense, and evenly distributed granular tubercles on the headshield with about 6–8 tubercles per square millimeter. In specimen V6259.6, ten branchial fossae are observed, and the estimated number of branchial fossae is approximately 18 pairs (Fig. 6B).

5 Discussion and conclusion

‘*Dongfangaspis qujingensis*’ can be confidently classified as the Polybranchiaspididae (Liu, 1965) because it displays a suit of diagnostic features of the family, including an oval-shaped headshield, developed median dorsal ridge and spine, leaf-shaped inner cornual process, V-shaped posterior supraorbital canal, and more than four pairs of lateral transverse canals issuing from the lateral dorsal canal. ‘*D. qujingensis*’ obviously differs from *Polybranchiaspis* (Liu, 1965; P’an and Wang, 1978; Tōng-Dzuy et al., 1995) by bearing broad leaf-shaped inner cornual processes that extend largely posterior to the end of the median dorsal spine, differs from *Siyingia* (Wang and Wang, 1982b) by lacking a high upright and compressed median dorsal spine, differs from *Cyclodiscaspis* (Liu, 1975) by lacking laterally positioned orbital openings, and differs from *Altigibbaspis* (Liu et al., 2018) by lacking blade-like median dorsal ridge. It was initially assigned to *Dongfangaspis* but was later referred to *Laxaspis* (Zhu and Gai, 2006, Zhu et al., 2015). *Dongfangaspis* was erected by Liu (1975) based on *Dongfangaspis major* from the Guanshanpo Formation (Pragian, Early Devonian) in Jiangyou, Sichuan Province. Meng et al. (2022) described a new specimen of *Dongfangaspis* sp. from the Haikou Formation (Eifelian, Middle Devonian) in Wuding, Yunnan Province. The two specimens of *Dongfangaspis* indicate that the large number of branchial fossae (about 45 pairs) is one important diagnosis of *Dongfangaspis*. This number is clearly larger than all other polybranchiaspid genera such as 12 pairs in *Polybranchiaspis*, 18 pairs in *Laxaspis* and *Damaspis*. The number of branchial fossae of ‘*Dongfangaspis qujingensis*’ is established 18 pairs as that of *Laxaspis* and *Damaspis* (Fig. 7). In addition, *Dongfangaspis* is the only genus of Polybranchiaspididae survived from the Pragian of Early Devonian to the Eifelian of Middle Devonian (Meng et al., 2022), whereas ‘*D. qujingensis*’ is collected from the lower Lochkovian

Xishancun Formation in Qujing, Yunnan Province. Therefore, it is unreasonable to assign ‘*D. qujingensis*’ to *Dongfangaspis*.

Our new materials and observations reveal that ‘*Dongfangaspis qujingensis*’ is more suggestive of *Damaspis* than *Dongfangaspis* and *Laxaspis*. Firstly, we reexamined all the materials of *Laxaspis*, including *L. qujingensis*, *L. yulongssus* (Liu, 1975; Janvier and Phuong, 1999), and the new specimens of *Laxaspis* cf. *L. qujingensis* from the lower part of the Xishancun Formation in Qujing (to be described in another paper). The stellated ends of sensory canals can be corroborated in the three species of *Laxaspis*, which can be regarded as a diagnostic character of *Laxaspis*. Therefore, the bifurcated end of the lateral transverse canal in ‘*Dongfangaspis qujingensis*’ is more similar to that of *Damaspis* than *Laxaspis* (Fig. 7).

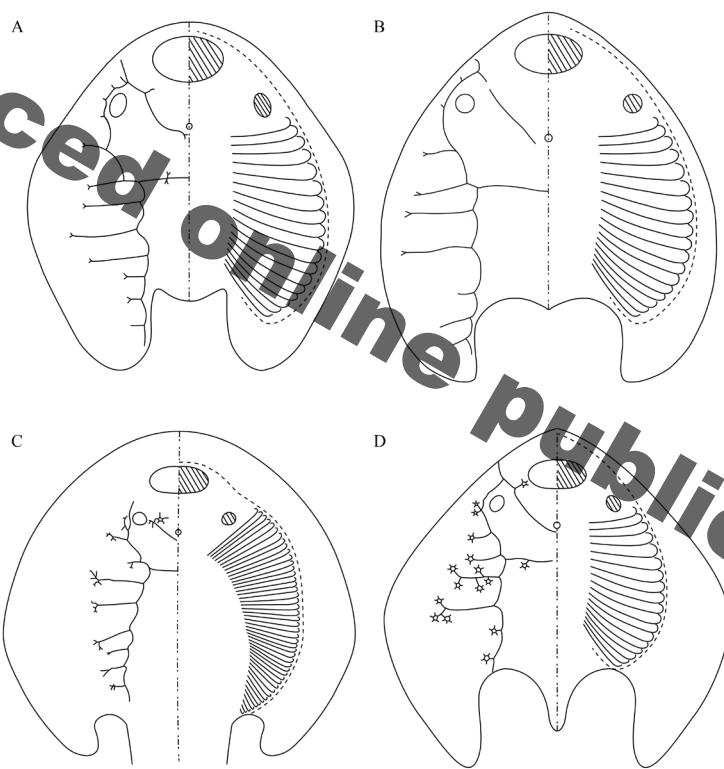


Fig. 7 Restoration of *Damaspis*, *Dongfangaspis*, and *Laxaspis*, showing their diagnostic differences
A–D. *Damaspis vartus*, *D. qujingensis*, *Dongfangaspis major*, and *Laxaspis qujingensis*,
respectively in dorsal view, not to scale; the left half part of the headshield shows the differences
in the sensory canal system, the right half part of the headshield shows the differences in branchial fossae

‘*D. qujingensis*’ also displays other differences from *L. qujingensis*. For example, the median dorsal spine of ‘*D. qujingensis*’ is much shorter than that of *L. qujingensis* (Fig. 7B, D) but more similar to that of *D. vartus*. Moreover, the posterior ends of the V-shaped posterior supraorbital canals are not connected in ‘*D. qujingensis*’, but are connected behind the pineal opening in *L. qujingensis*. By contrast, ‘*D. qujingensis*’ shows more resemblance to *Damaspis*

vartus than to *L. qujingensis* in the aspect of width/length ratio (less than 1) of the headshield, bifurcated ends of the sensory canals, paired posterior supraorbital canals being not connected, and at least seven pairs of lateral transverse canals issuing from the lateral dorsal canal (Fig. 7A, B). Therefore, we propose to remove ‘*D. qujingensis*’ out of *Laxaspis* to *Damaspis*. Compared with *Damaspis vartus*, ‘*D. qujingensis*’ has a larger headshield and larger and stellated tubercles. Most prominently, our new data indicates that *Damaspis vartus* bears four lateral transverse canals ($l_{tc_{a-d}}$) issuing from the infraorbital canals (two more than that of ‘*D. qujingensis*’) and five long lateral transverse canals issuing from the lateral dorsal canal, which not only distinguishes it from ‘*D. qujingensis*’ but also from all other polybranchiaspid fish. Considering these differences, we regarded ‘*D. qujingensis*’ as a new species of *Damaspis*, *Damaspis qujingensis*.

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云南曲靖下泥盆统“曲靖东方鱼”的分类学厘定

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摘要: “曲靖东方鱼”(‘*Dongfangaspis qujingensis*’)的归属长期以来存在争议, 其最初被归入东方鱼属(*Dongfangaspis*), 之后被归入宽甲鱼属(*Laxaspis*)。然而, 由于宽甲鱼属模式种为曲靖宽甲鱼(*Laxaspis qujingensis*), 这一分类学厘定又引起异物同名的问题。描述了来自云南曲靖早泥盆世洛赫考夫期西山村组的“曲靖东方鱼”和变异坝鱼(*Damaspis vartus*)的新材料。“曲靖东方鱼”在头甲长略大于宽, 侧横管末端呈二分叉, V字型后眶上管不汇合, 以及至少7条侧横管从侧背管发出等方面与变异坝鱼高度相似。这些相似之处表明, 相较于宽甲鱼属和东方鱼属, “曲靖东方鱼”更接近坝鱼属。因此提出将“曲靖东方鱼”从宽甲鱼属中移除, 归入坝鱼属。新标本表明变异坝鱼多出来第5对长的侧横管是该种的一个鉴别特征, 而正型标本所呈现的非对称感觉管系统应为种内变异所造成。

关键词: 云南曲靖, 下泥盆统, 西山村组, 盔甲鱼类, 多鳃鱼科, 坎鱼属

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